USGS
science for a changing world

Earthquakes ★ Floods ★ Hurricanes ★ Landslides ★ Tsunamis ★ Volcanoes ★ Wildfires

Building a More Resilient Nation

USGS Director Mark Myers

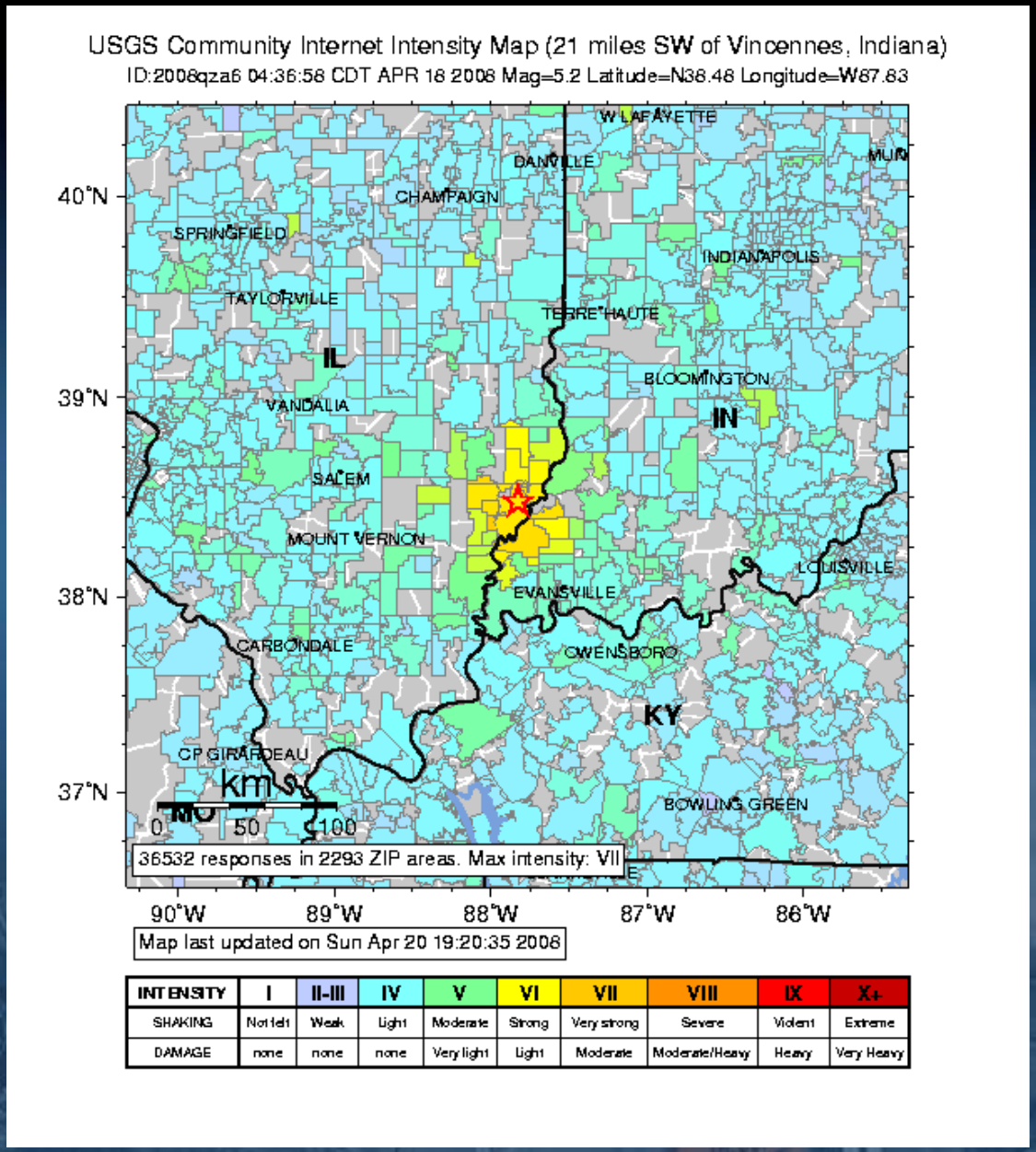
National Earthquake Conference

April 23, 2008

U.S. Department of the Interior
U.S. Geological Survey

Last week's magnitude-5.2 earthquake in Illinois

- Over 36,000 Did You Feel It? reports on the USGS web site
- Felt reports from 16 states plus Ontario, Canada
- Reminder that earthquakes are a national issue



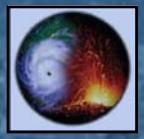
USGS nehrp

Facing Tomorrow's Challenges – USGS Science in the Decade 2007-2017

Understanding Ecosystems and Predicting Ecosystem Change

Climate Variability and Change

Energy and Minerals for America's Future



A National Hazards, Risk, and Resilience Assessment Program

The Role of Environment and Wildlife in Human Health

A Water Census of the United States

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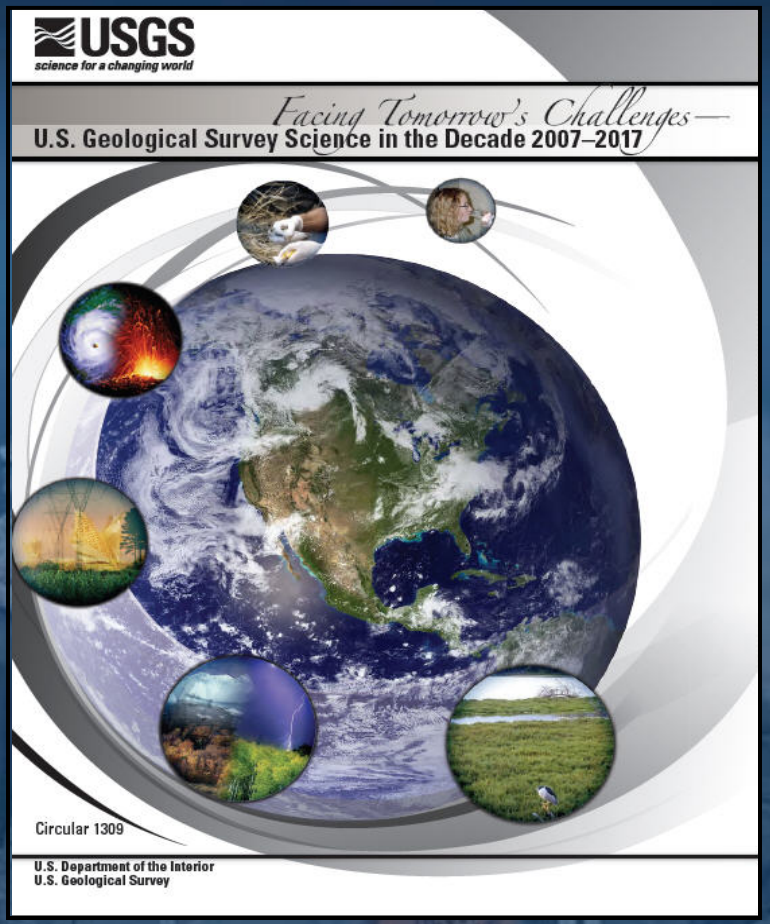
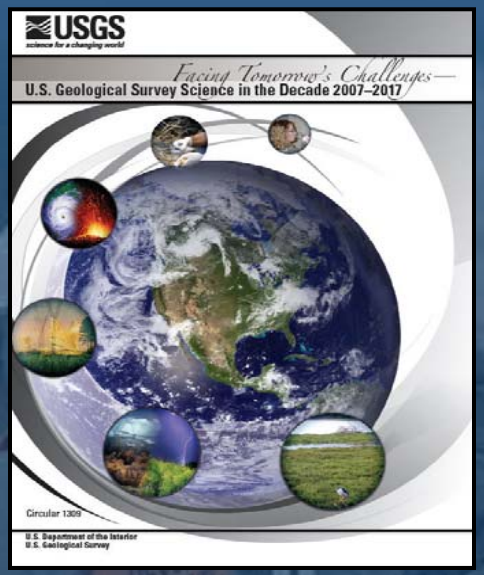


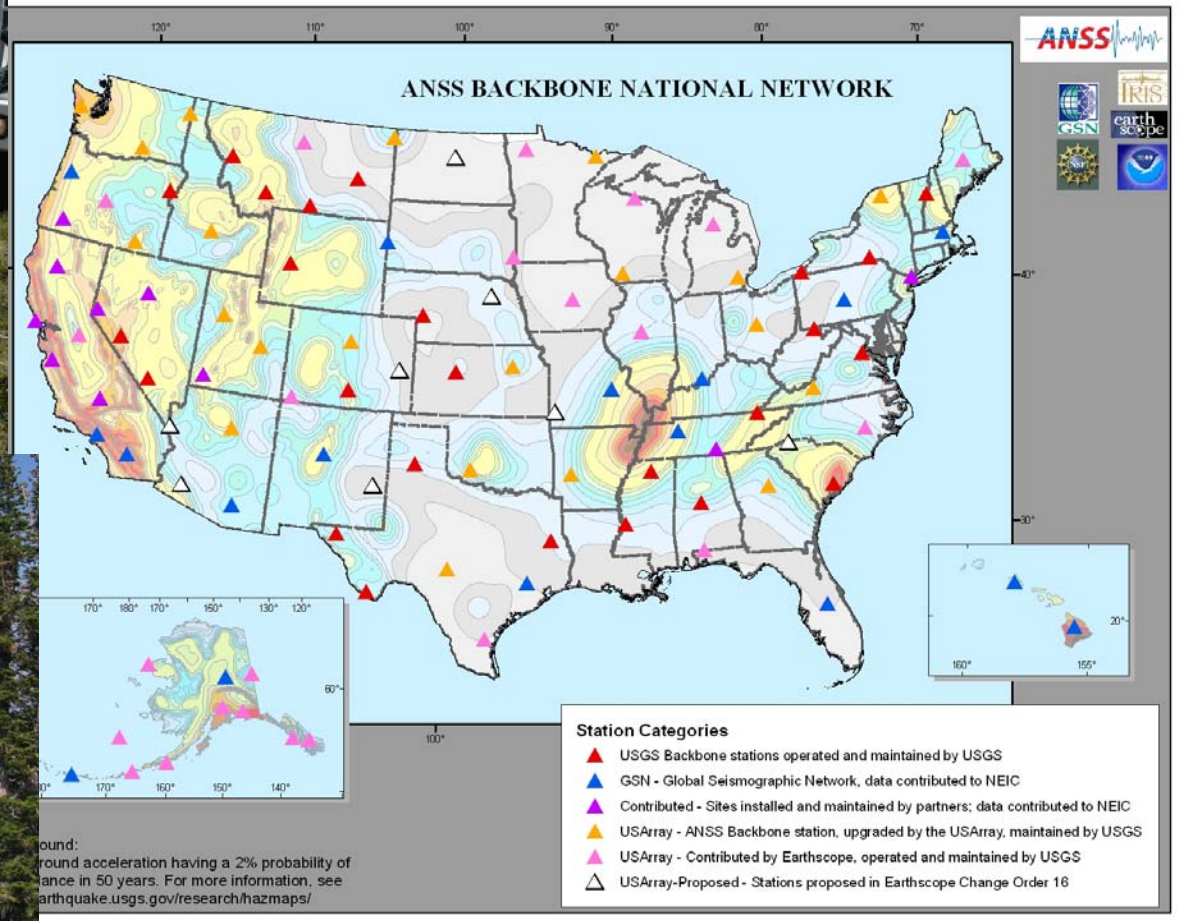
Hazards in the USGS Science Strategy

- Robust monitoring infrastructure and technology for network communications
- Characterizing and assessing hazards
- Improved forecasting capability based on understanding physical processes

In all these areas, partnerships are vital for a coordinated hazard and risk program



Advanced National Seismic System (ANSS)



USGS nehrp NSF

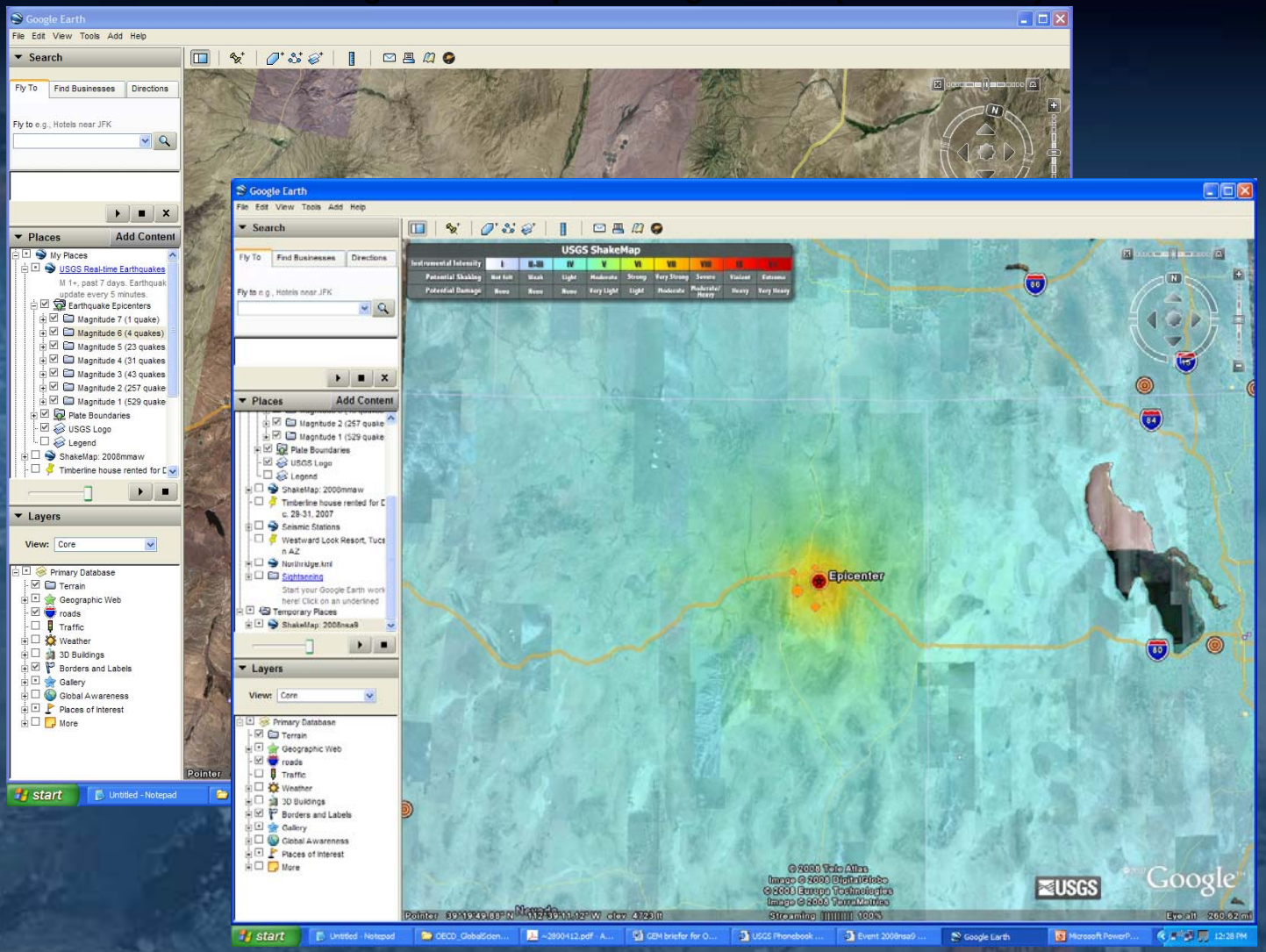
Backbone completion with support from NSF's EarthScope

ANSS

ShakeMap now available as Google Earth transparent overlay

Wells, Nevada magnitude-6 earthquake

Feb. 21, 2008



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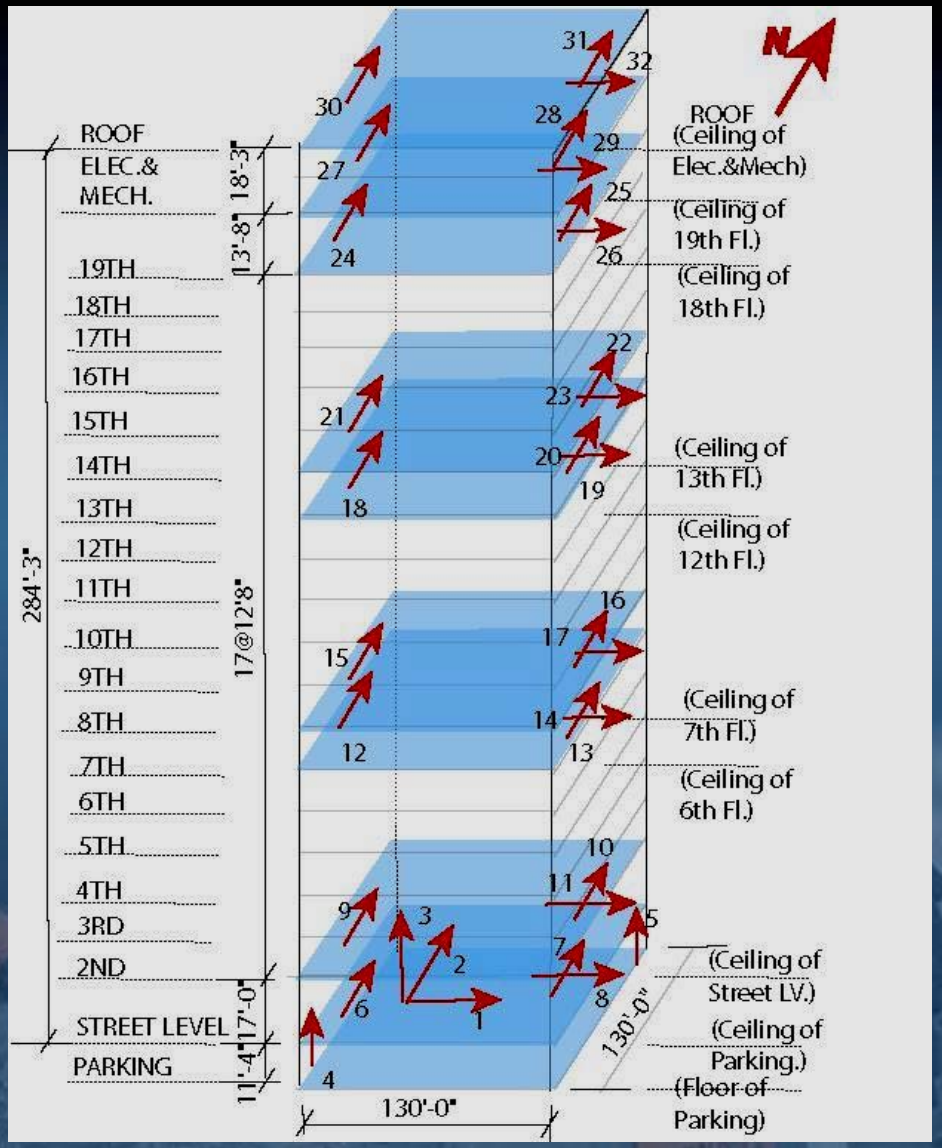
ANSS monitoring of structures

Structural Array in Atwood Building, Anchorage AK



National Volcano Early Warning System: Closing the monitoring gap

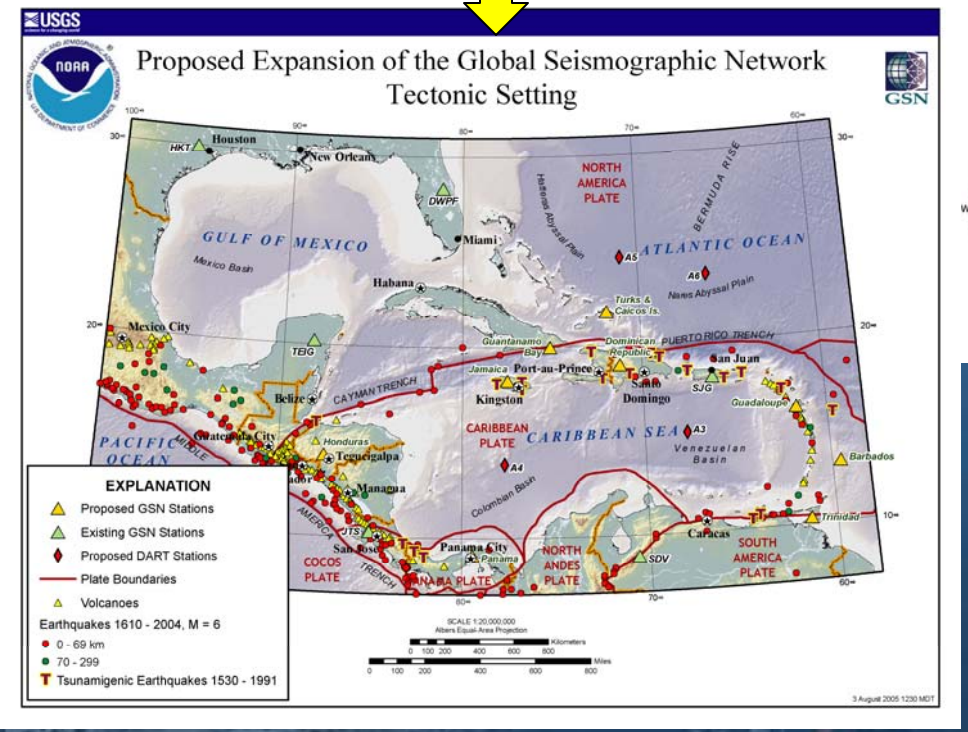
Mt. St. Helens

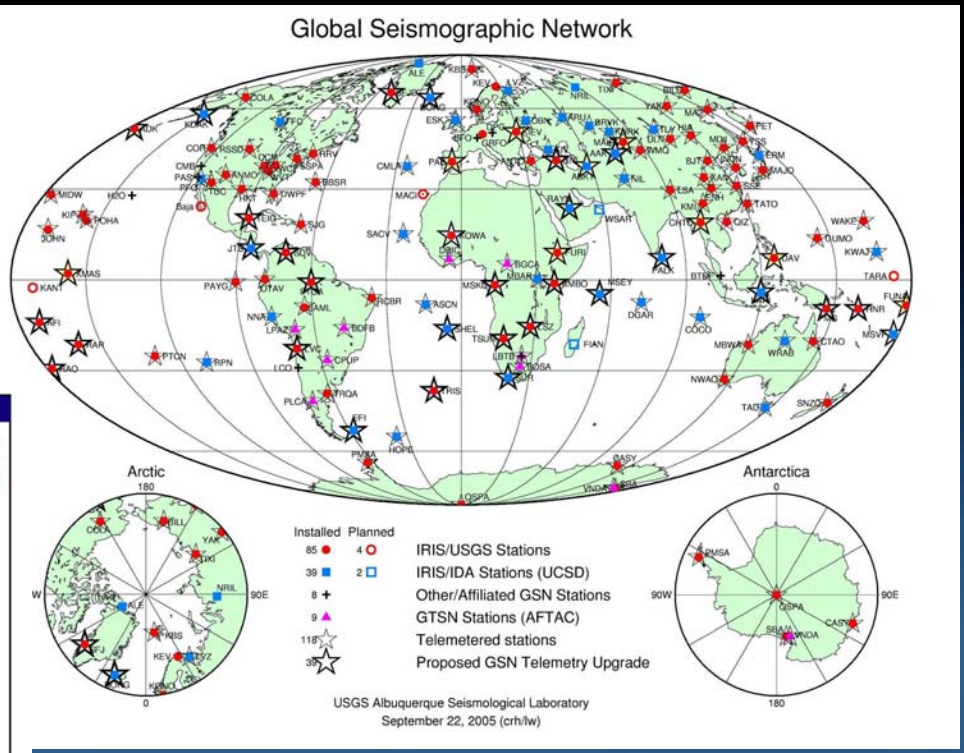
Mt. Rainier

NVEWS TARGETS	MONITORING GAP
Kilauea, HI	1 ERUPTION
St. Helens, WA	1 ERUPTION
Rainier, WA	3
Hood, OR	3
Shasta, CA	3
South Sister, OR	3
Lassen, CA	3
Mauna Loa, HI	2
Redoubt, AK	2
Makushin. AK	2
Glacier Peak, WA	4
Akutan, AK	2
Baker, WA	3
Spurr, AK	2
Newberry Volcano,OR	3
Augustine, AK	2
Crater Lake, OR	4
Inyo Craters., CA	3
Adams, WA,	2
Veniaminof, AK	1 ERUPTION
Wrangell, AK	2
Mono Craters, CA	3
Hualalai, HI	2
Medicine Lake, CA	3
Pagan, CNMI	3
Churchill, AK	3
Anatahan, CNMI	2 ERUPTION
Clear Lake, CA	3
Alamagan, CNMI	3
Kaguyak, AK	2
Dutton, AK	2
Hayes, AK	3
Emmons Lake, AK	2
Seguam, AK	3
Chiginagak, AK	3

Global Seismographic Network

9 new stations to support NOAA Caribbean tsunami warning system





- **32 stations upgraded**
- **Bandwidth expanded at 21 stations**
- **Telemetry added to 8 stations**

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PAGER

Prompt
Assessment of
Global
Earthquakes for
Response

http://earthquake.usgs.gov/pager/

USGS science for a changing world

GSN USAID FROM THE AMERICAN PEOPLE

M 8.4, SOUTHERN SUMATRA, INDONESIA

Origin Time: Wed 2007-09-12 11:10:26 UTC
Location: 4.52°S 101.38°E Depth: 30 km

PAGER
Version 11
Created: 6 hrs, 7 mins after earthquake

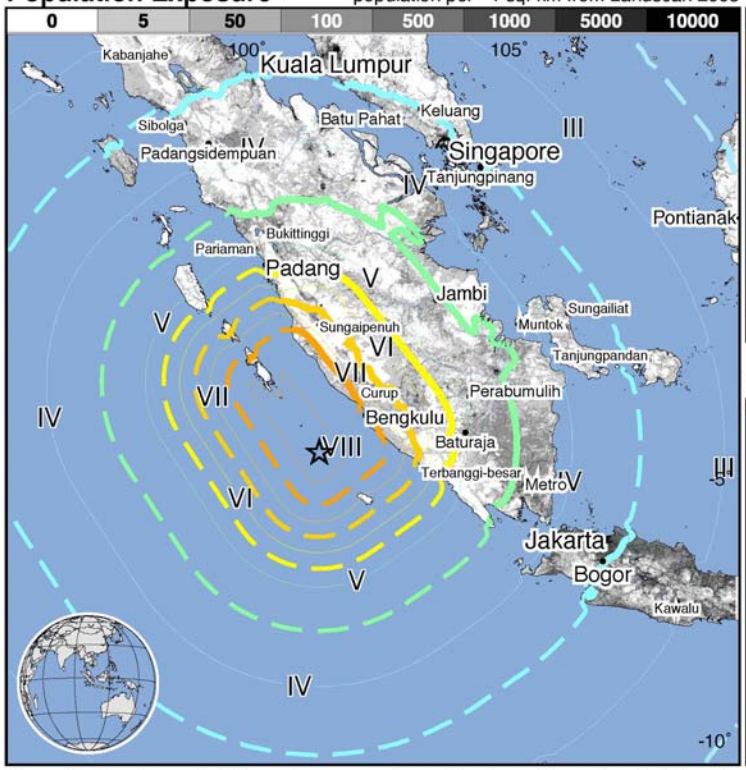
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	54,342k*	53,605k	12,285k	2,632k	2,014k	480k	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure

population per ~1 sq. km from Landscan 2005



Selected City Exposure

MMI	City	Population
VII	**Curup**	**46k**
VII	**Sungaipenuh**	**95k**
VII	Pagaralam	70k
VI	**Bengkulu**	**309k**
V	Palembang	1,441k
IV	**Singapore**	**3,547k**
IV	**Jakarta**	**8,540k**
IV	Tangerang	1,372k
IV	Bekasi	1,520k
III	**Kuala Lumpur**	**1,453k**
III	Bandung	1,699k

bold cities appear on map (k = x1000)

Shaking Intensity

MMI

Overall, structures in this region are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 7.9 earthquake struck the offshore Bengkulu, Indonesia region on June 4, 2000, with estimated population exposures of 2,000 at intensity VIII and 510,000 at intensity VII, resulting in 103 deaths. Recent earthquakes in this area have also triggered tsunami, landslide and liquefaction hazards that have contributed to losses.

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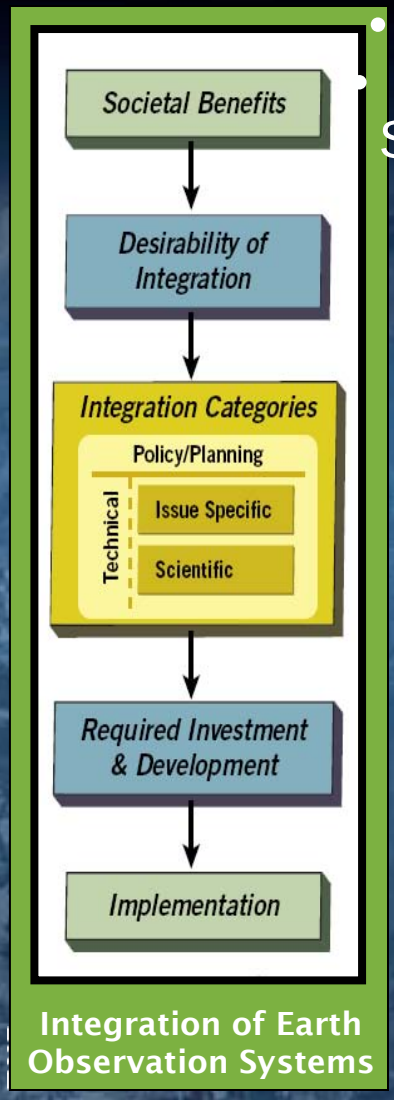
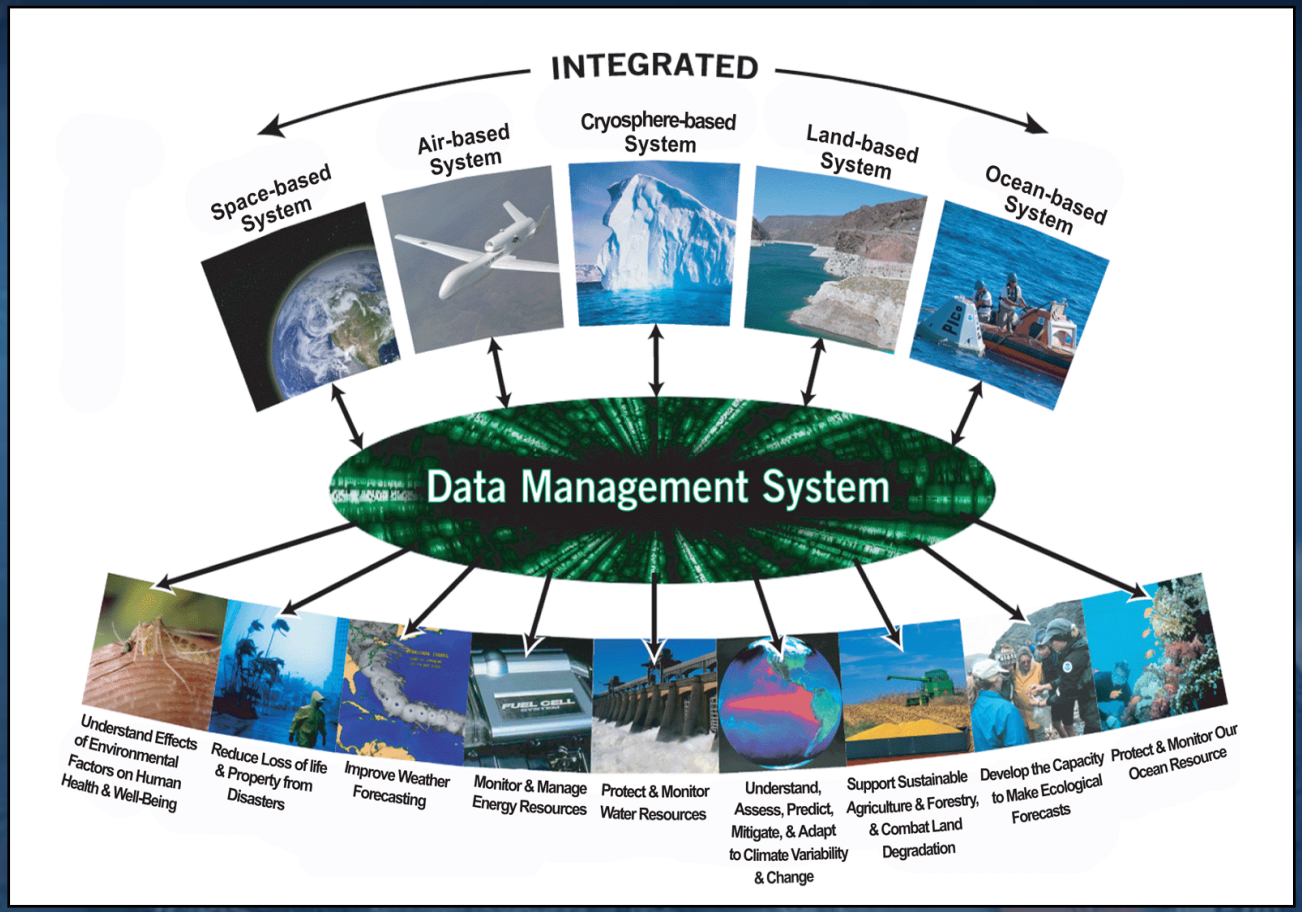
USGEO

- Earth Observation
- Science
- Societal Benefit

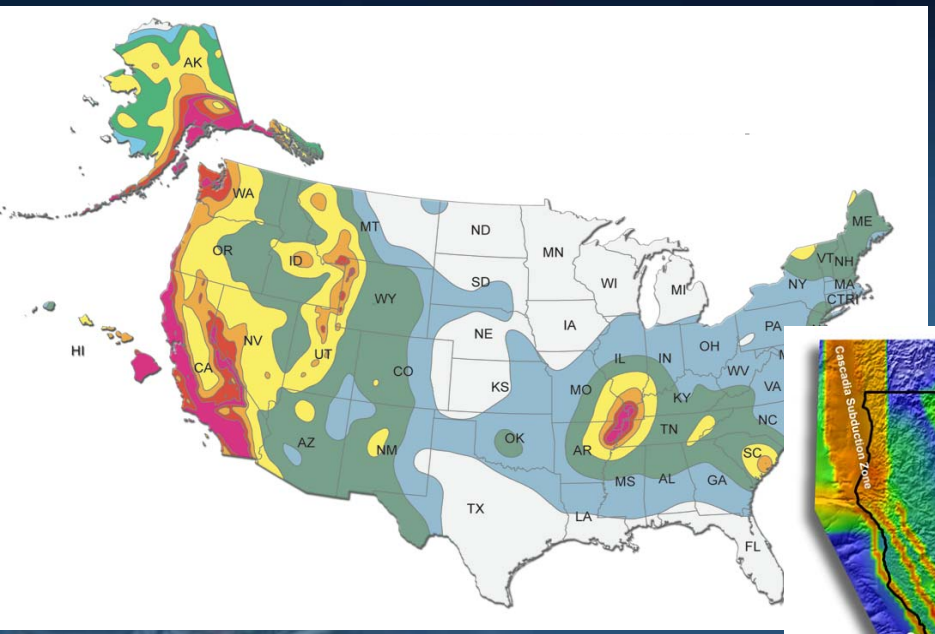


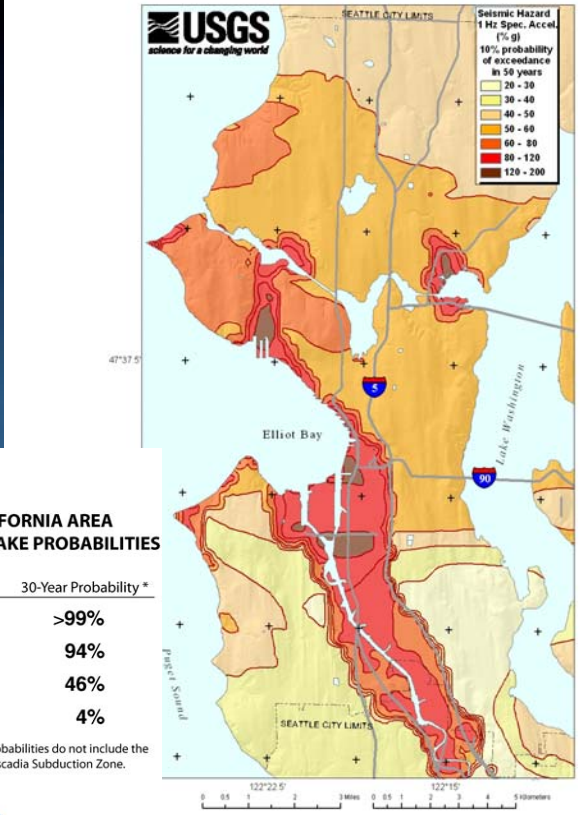
Integration of Earth Observation Systems

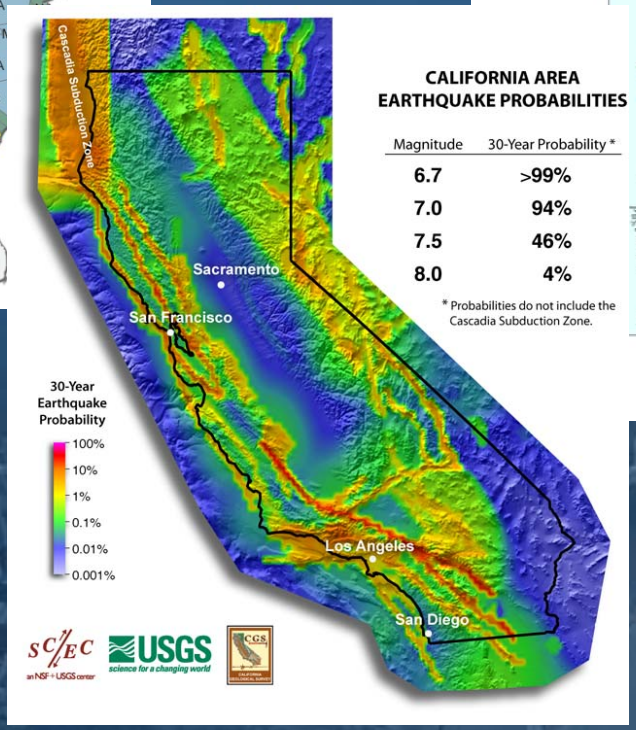


Seismic hazard assessments: National, regional, urban

U.S. National Seismic Hazard Maps







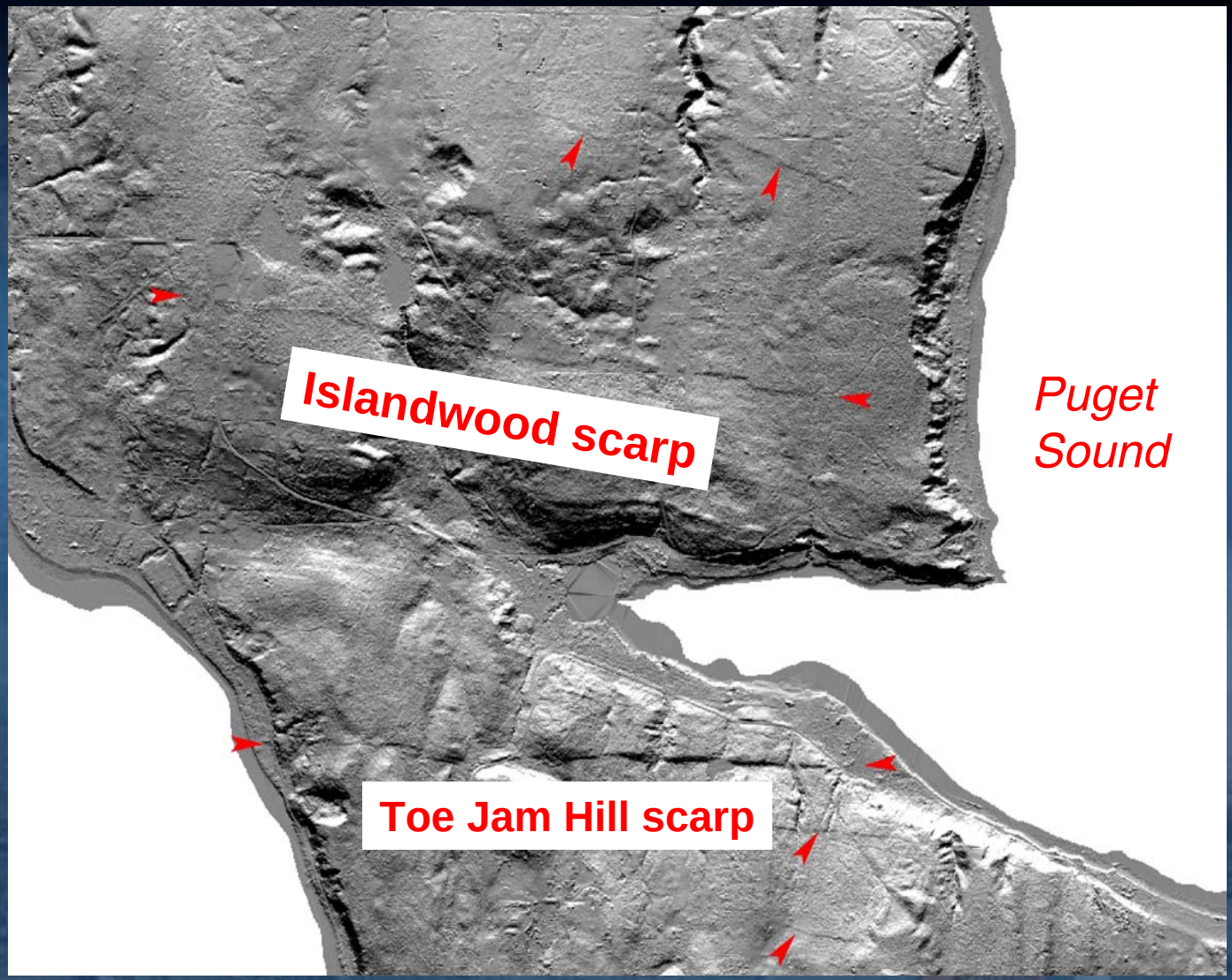
Uniform California Earthquake Rupture Forecast

USGS

Seattle urban hazard map

LIDAR: Revolutionizing hazard mapping in the Pacific Northwest and elsewhere

Bainbridge Island WA



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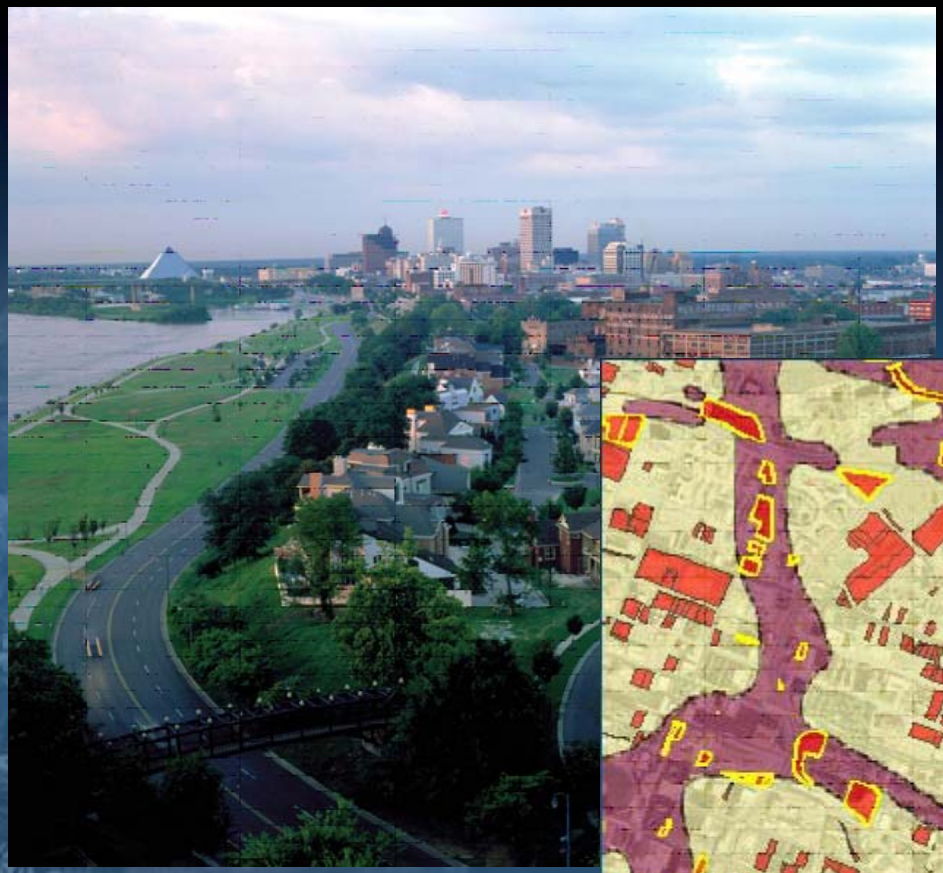
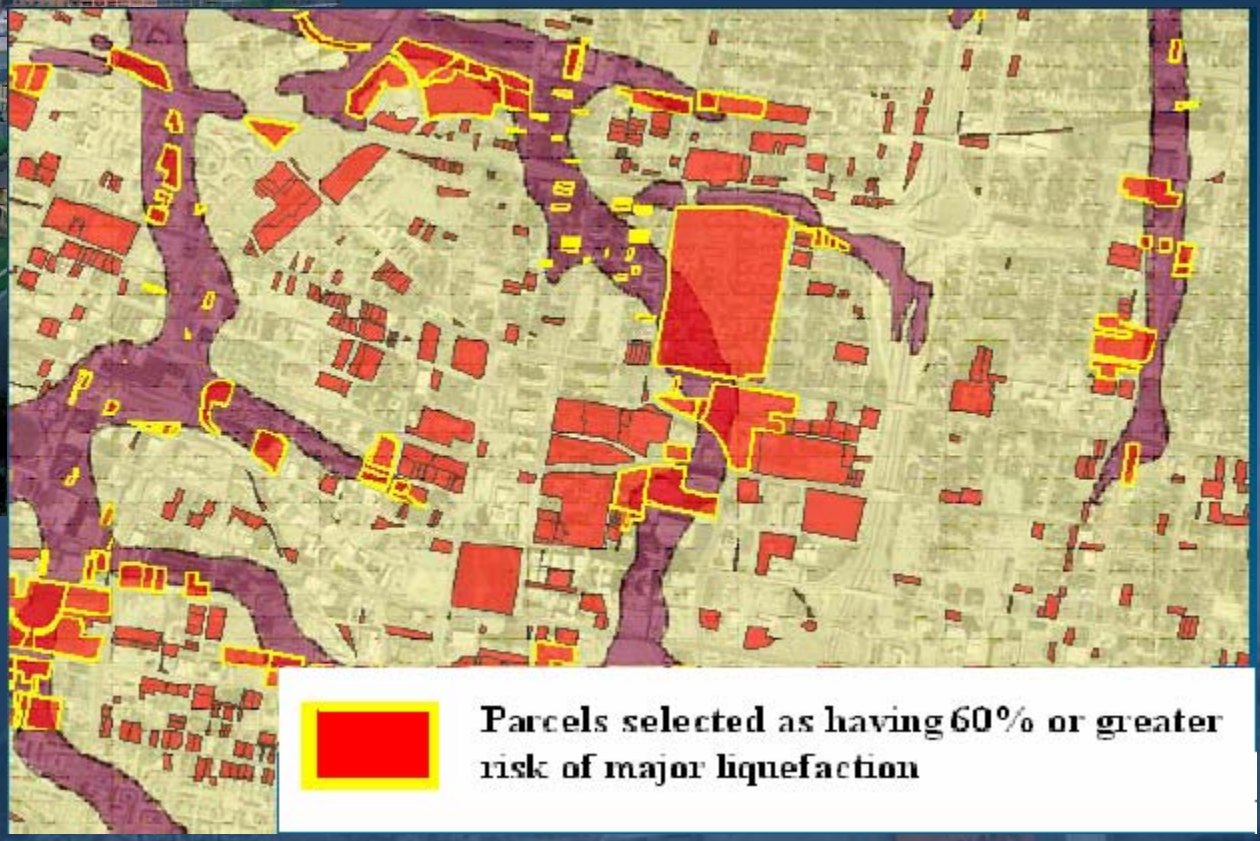
Land Use Portfolio Model used in Memphis





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Scenarios: Making the hazard real

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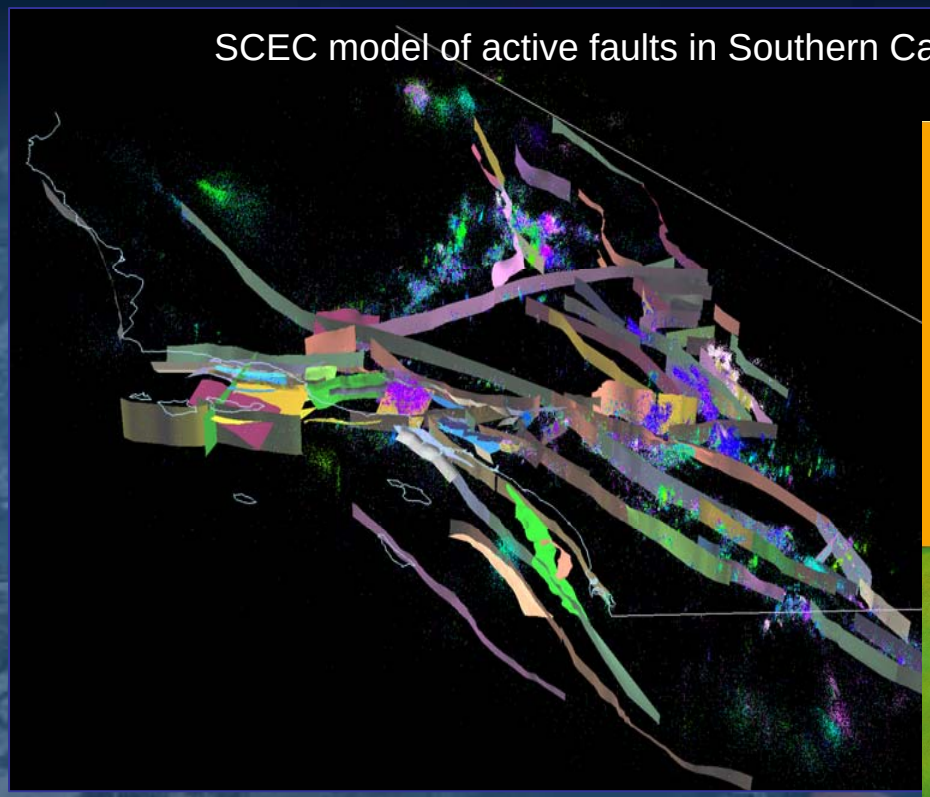
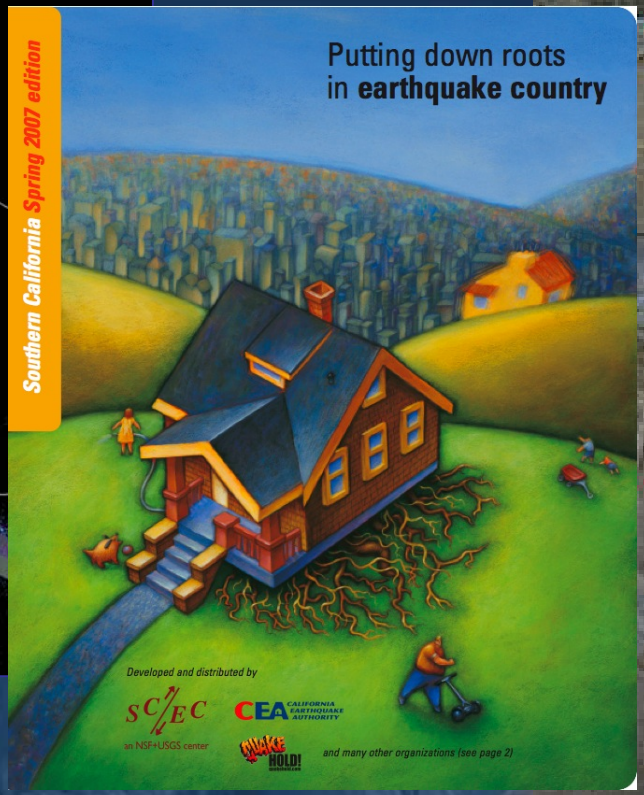
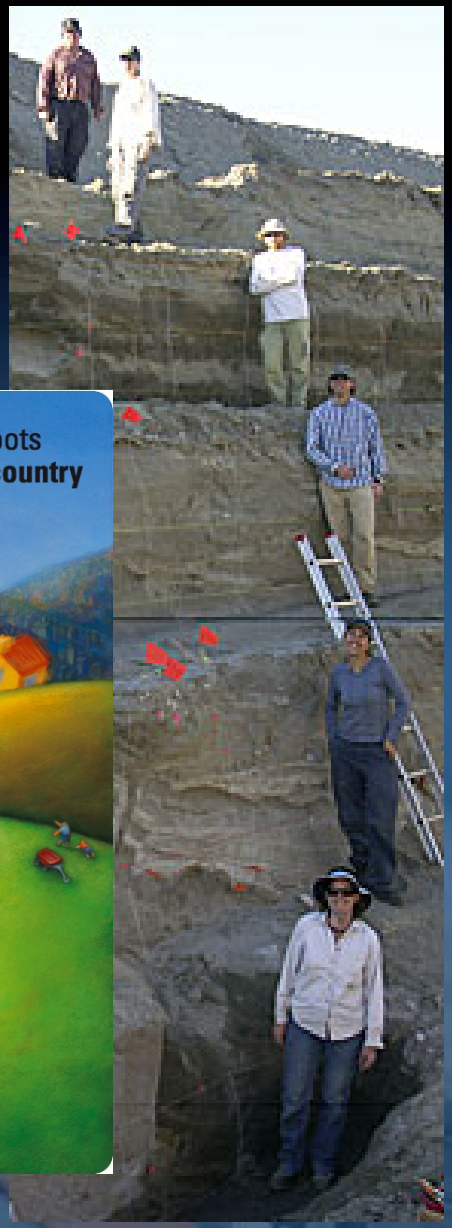
Southern California Earthquake Center: A collaboration with NSF and the university community

SCEC model of active faults in Southern California



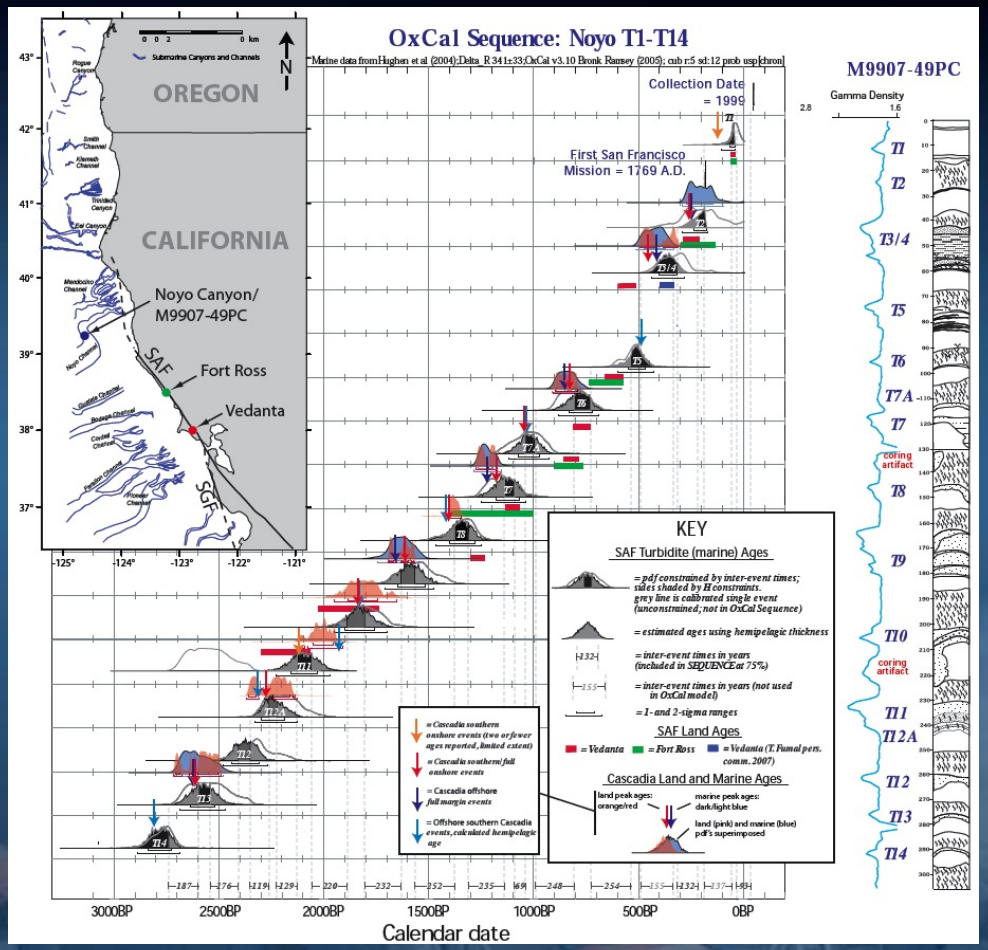




Trenching the San Andreas Fault

External grants and cooperative agreements: a key component of the Earthquake Hazards Program

- Approximately 25% of core program funds
- Gives flexibility and adds breadth of expertise to program
- Leverages support from other state and federal agencies, and universities



USGS-funded research by Goldfinger et al. uses turbidites to determine precise ages for earthquakes on the Cascadia Subduction Zone

External advice – SESAC and NEPEC

- **Scientific Earthquake Studies Advisory Committee**
  - Mark Zoback, *Chairman*
  - Ralph Archuleta (Chair, ANSS Steering Committee)
  - James Dieterich
  - Art Lerner-Lam
  - Vicki McConnell
  - Stuart Nishenko
  - John Parrish
  - Ellen Rathje
  - Garry Rogers

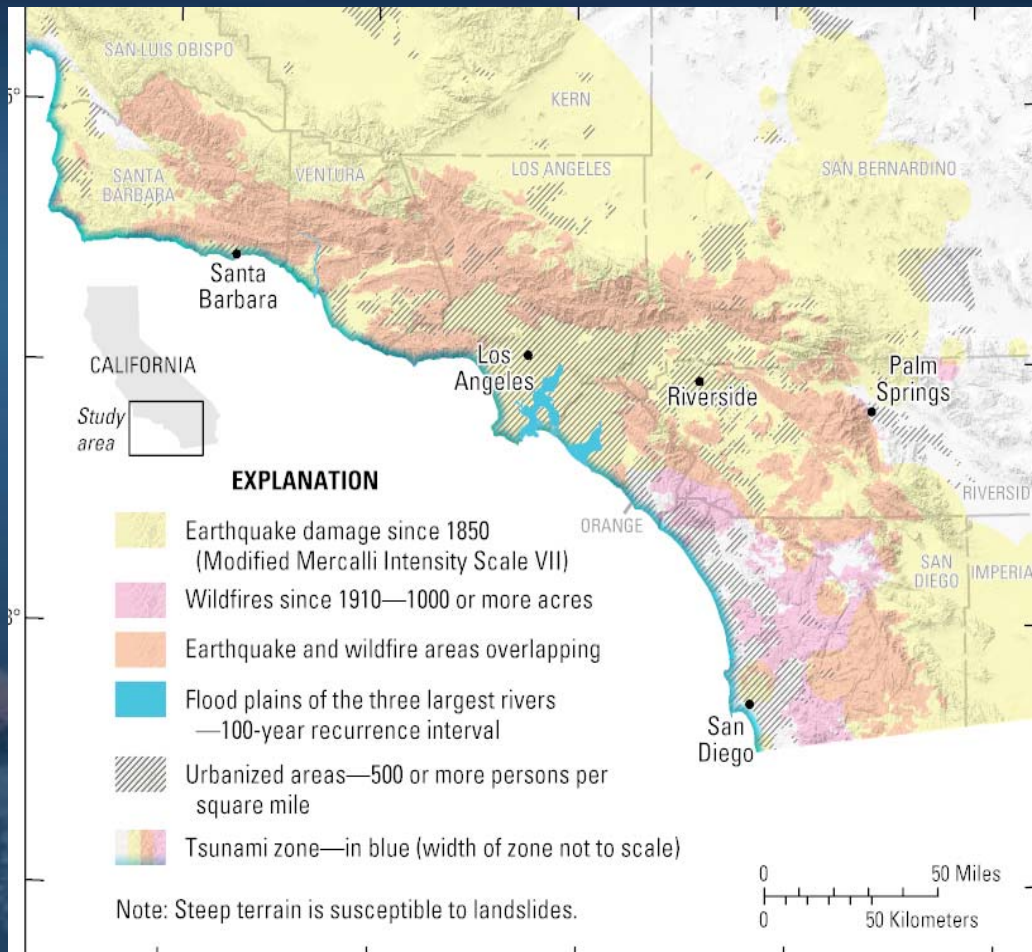
- **National Earthquake Prediction Evaluation Council**
  - Jim Dieterich, *Chair*
  - Dave Applegate*, *Vice-chair*
  - Ramon Arrowsmith
  - Göran Ekström
  - William Ellsworth*
  - David Jackson
  - Evelyn Roeloffs*
  - Barbara Romanowicz
  - Bruce Shaw
  - Wayne Thatcher*
  - Jeroen Tromp
  - Mary Lou Zoback

USGS

*** USGS staff**

USGS initiated Multi-hazard Demonstration Project in 2007

- Focused on reducing losses in Southern California: a region subject to multiple hazards
- Integrate information from multiple hazards to improve usefulness
- Work closely with dozens of partner organizations to leverage resources and optimize performance



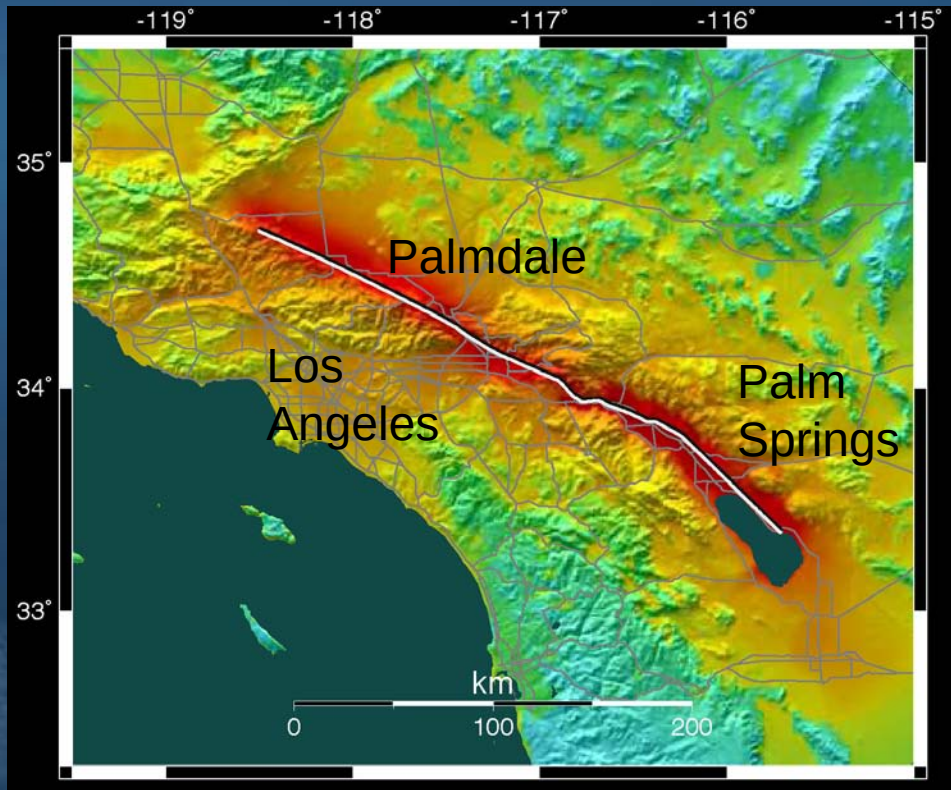
The Great Southern California ShakeOut

- USGS and partners are creating complete “rupture-to-recovery scenario” for plausible worst-case earthquake
- Agreement with Office of Homeland Security to use this scenario for the 2008 “Golden Guardian Exercise”; includes school and business drills

DARE to prepare

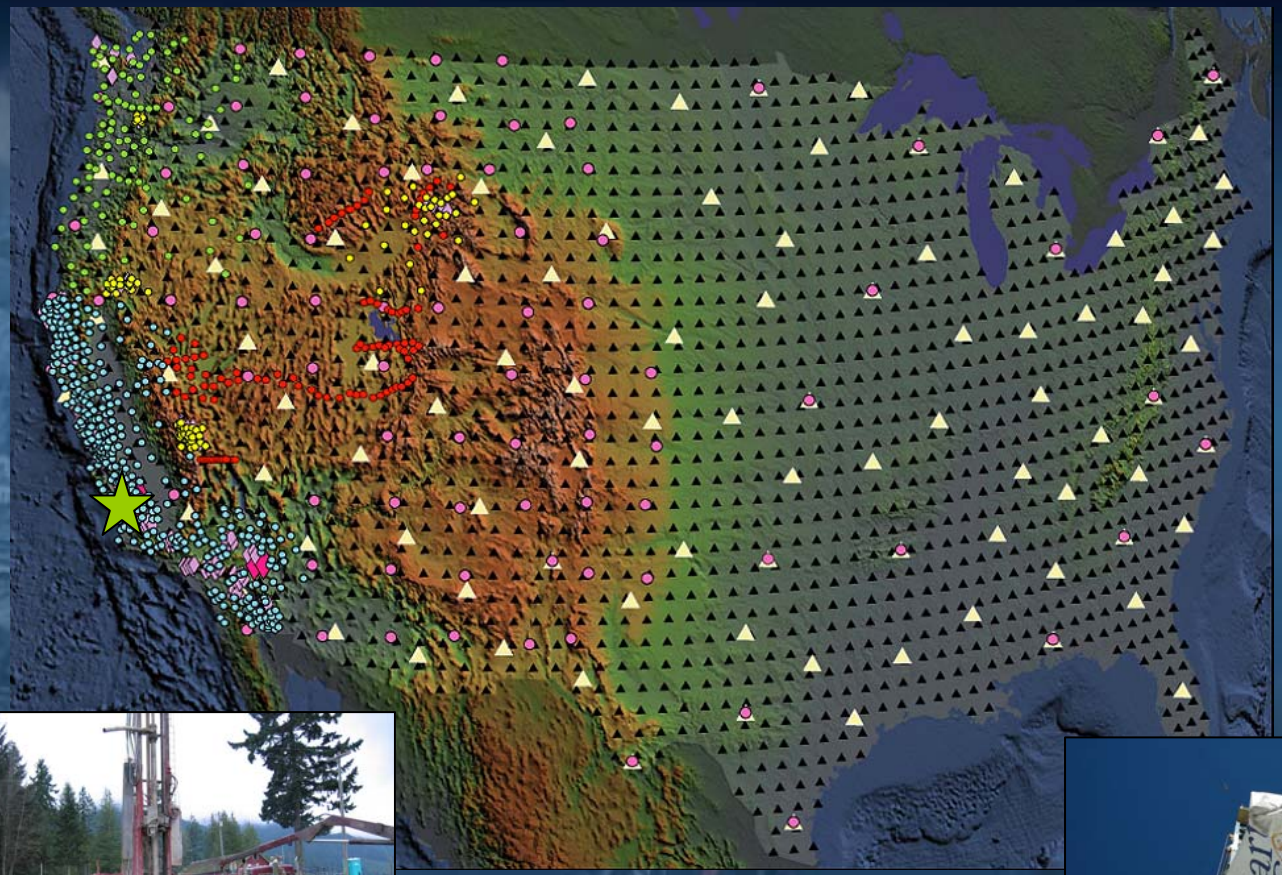
2007 Earthquake Readiness Campaign

USGS

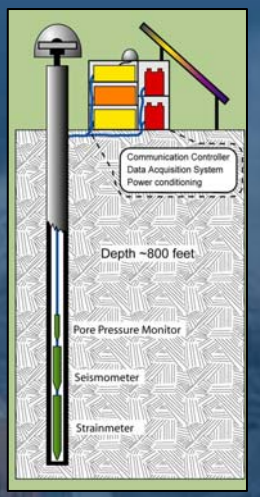


USGS - a proud partner in NSF's EarthScope

- Exploring the structure and evolution of the North American continent
- Understanding processes causing earthquakes and volcanic eruptions



- Drilling into the San Andreas Fault
- Portable Seismometers
- Permanent Seismometers
- GPS Stations
- Borehole Strainmeters
- Long-baseline Laser Strainmeters

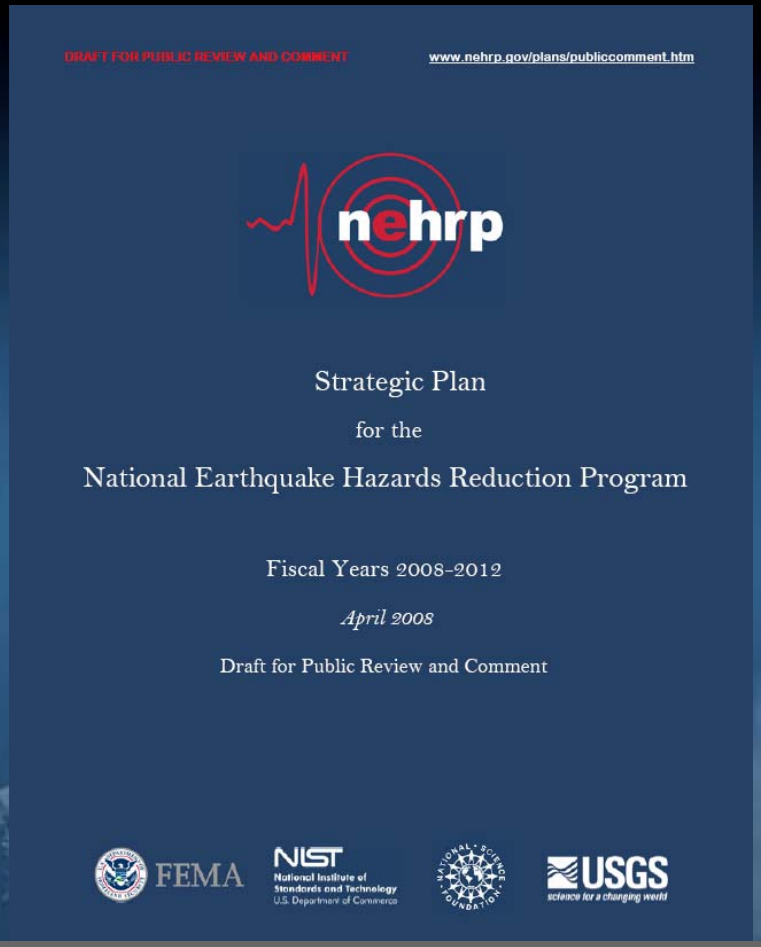


The mandate of the National Earthquake Hazard Reduction Program

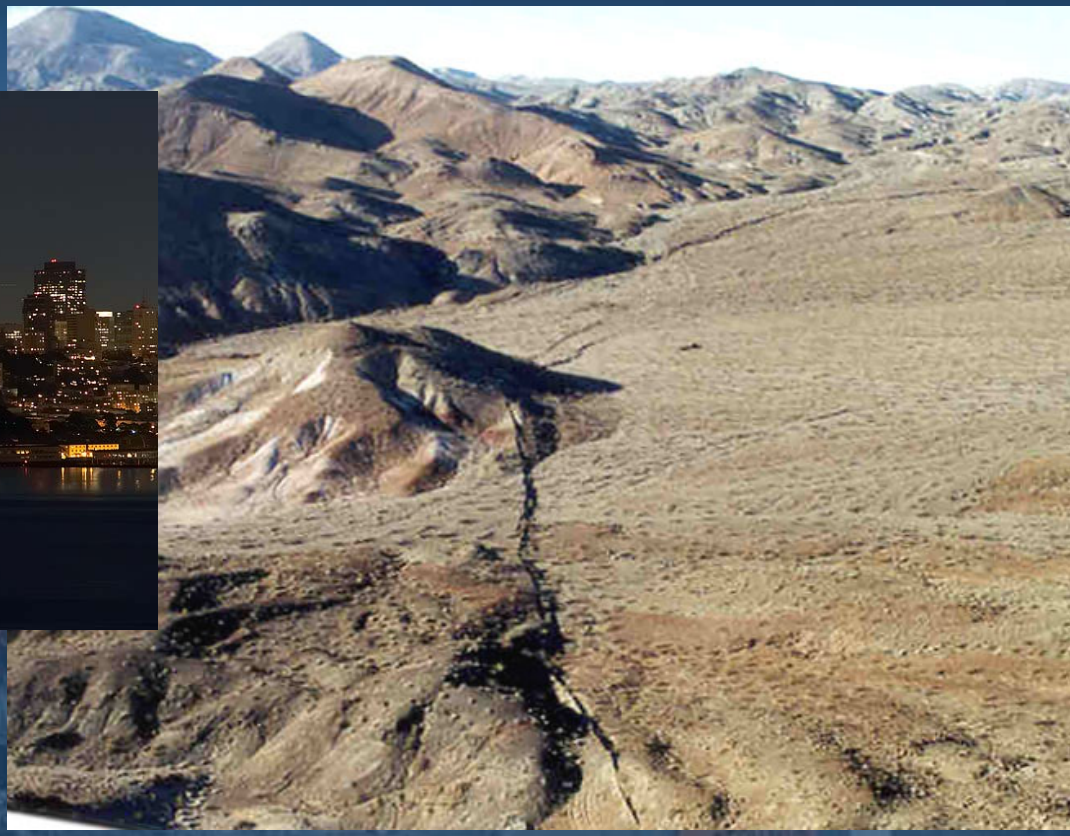
- Develop effective measures for earthquake loss reduction;
- Promote their adoption;
- Improve the understanding of earthquakes and their effects on communities, buildings, structures, and lifelines.

Draft NEHRP strategic plan available for public comment

- Identifies strategic priorities for NEHRP
- Comments accepted until May 9th
- Visit www.nehrp.gov



Science in partnership - a more resilient Nation



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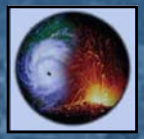

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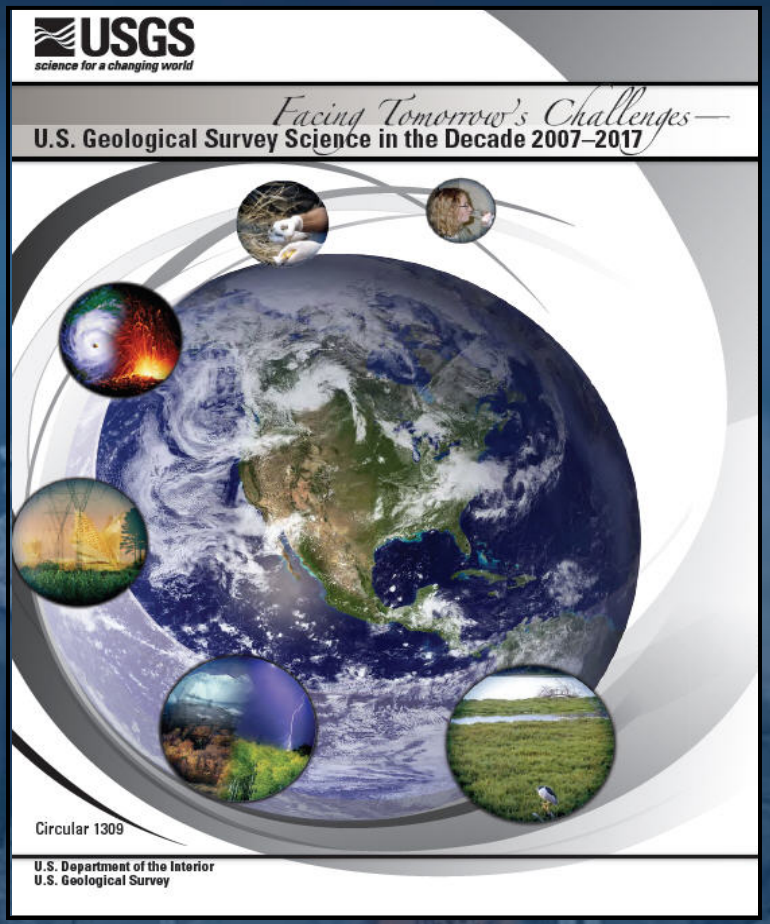

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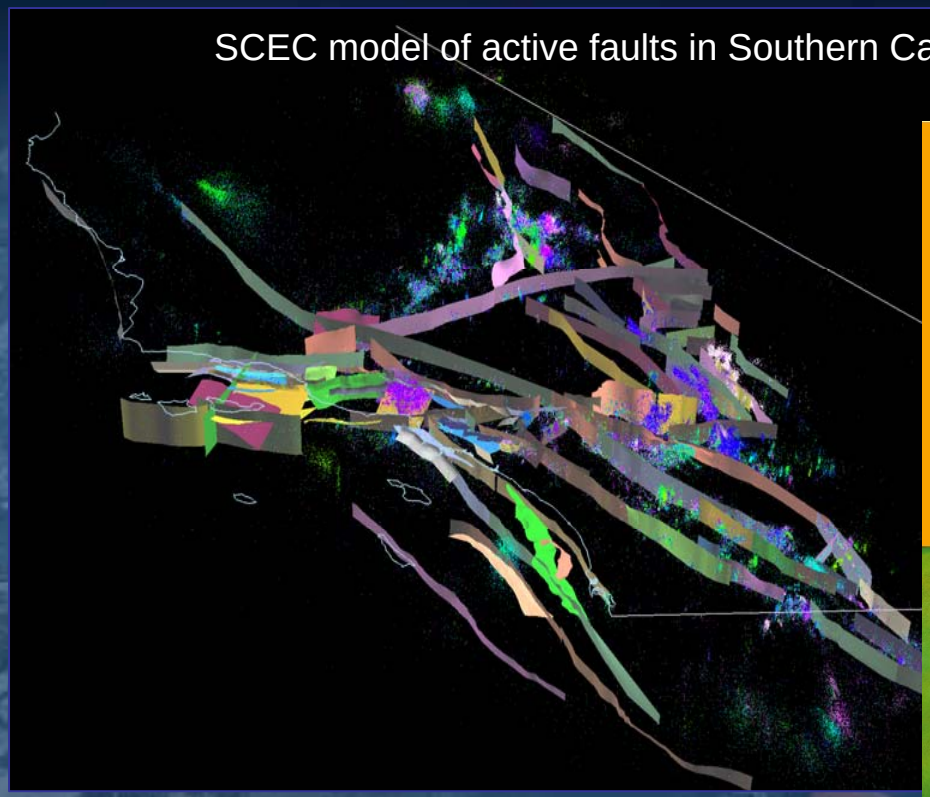

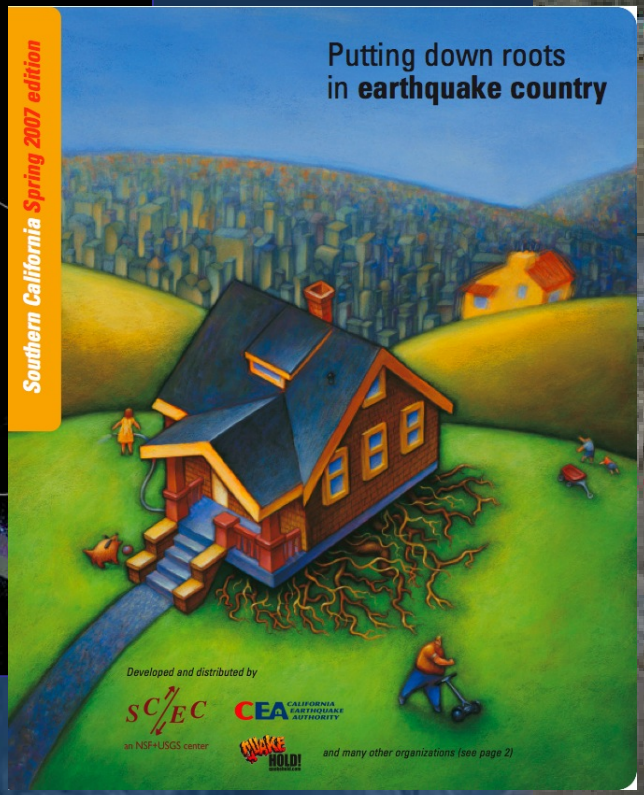

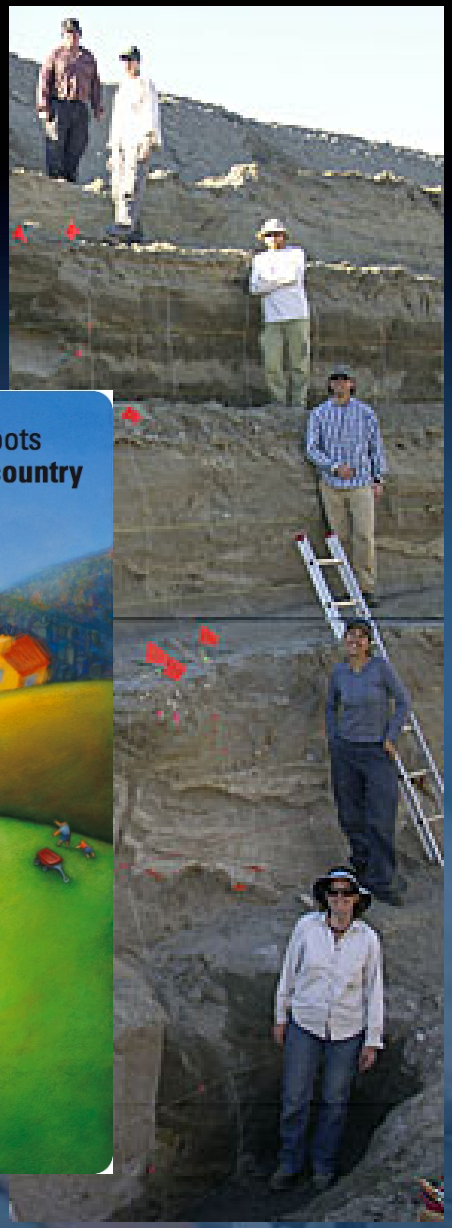

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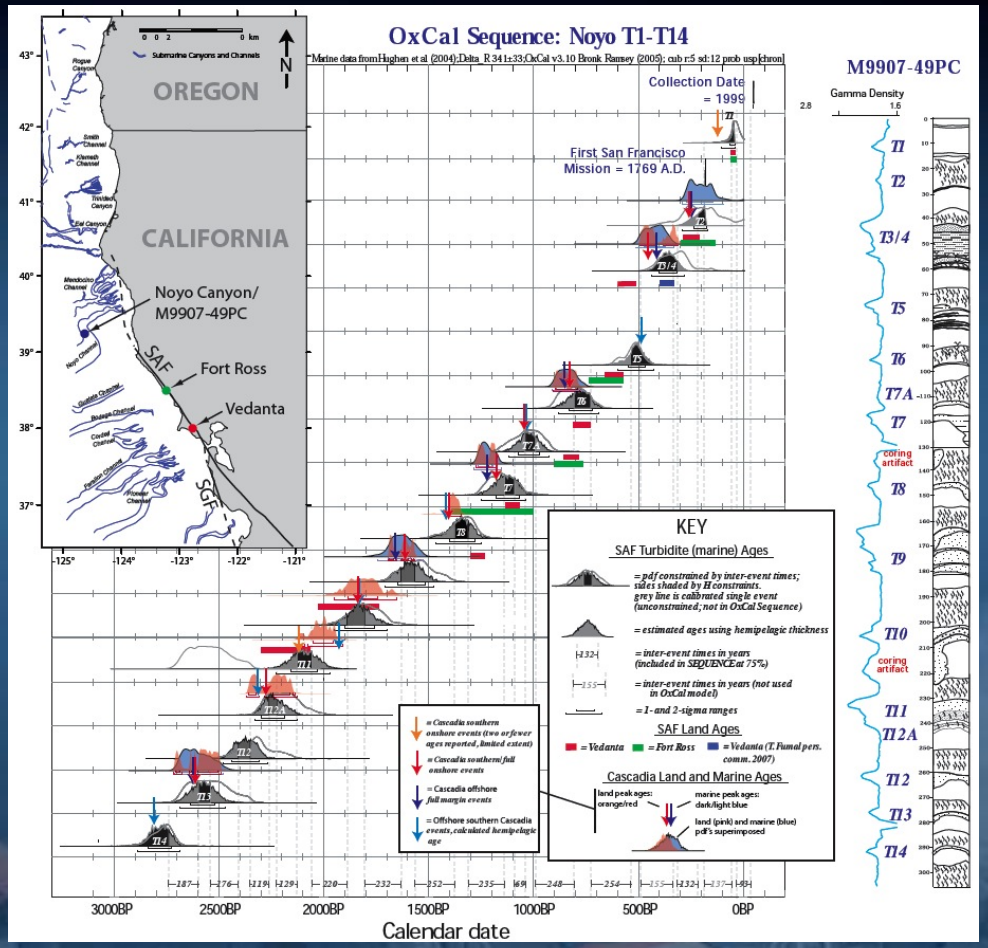

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